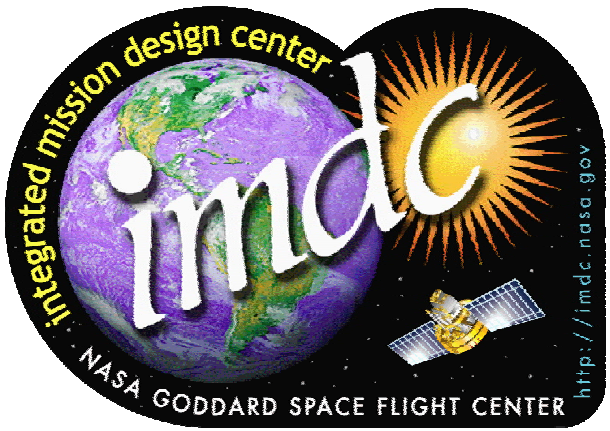
Fresnel Lens Gamma Ray Telescope

Introduction



John Martin
January 7-10, 2002

IMDC Study Goals

- **Present a study of a very long (~750,000 km) focal length Gamma Ray telescope**
- **Information is desired for both a pathfinder and a definitive mission, but emphasize the definitive mission**
  - Major difficulty appears to be the metrology arrangement for keeping the lenscraft and detectorcraft aimed with a knowledge of <1 microarcsecond. The metrology arrangement needed was considered so difficult that study of it would require more time than the 4-day study period.
  - The metrology arrangement would include position and attitude control between the spacecraft, probably using a laser ranging link which could also be used to communicate any other engineering data between spacecraft. No aspects of this metrology arrangement were included in detailed analysis or cost estimates.
  - Concepts for the definitive mission (with possible exception of the metrology) can be easily downscoped to a sensible pathfinder mission
    - Definitive mission may consist of a single lenscraft and multiple detectorcraft, requiring multiple launches
    - A "pathfinder" mission may be single launch of at least one lenscraft and one detectorcraft

Requested Trades or Special Studies

- Thrusters and fuel for achieving orbit, maintaining pointing and for repointing
- Achieve pointing of the line joining the target, lenscraft and detectorcraft by control of attitude (e.g., star sensor(s)) or by control of orbital position (e.g., navigation)

Requested Products

- PowerPoint slides containing conclusions and recommendations
- "Formal" presentation of results at end of study
- System mass and power spreadsheets, using "real" data where available and typical data for elements lacking specific information
  - Individual elements of mass and power provided where known; details of the metrology arrangement are very preliminary
- Files of supporting analysis (e.g., Excel spreadsheets)
- Power System Sizing
- Mission cost Spreadsheet, using "real" data where available and typical data for elements lacking specific information

Analyses Show:

Feasible Items and Items Needing Significant Development

- System – Gabe Karpati
- Flight Dynamics – Steve Cooley
- Mechanical – Dave Peters
- Launch Vehicle – Larry Phillips
- Attitude Control – Paul Mason
- Propulsion – Bob Estes
- Power – Tom Spitzer
- Command & Data Handling – Terry Smith
- Flight Software – Charlie Wildermann
- Data Systems – Ron Vento
- Thermal – Rob Chalmers
- Mission Operations – Tim Rykowski
- Reliability & Safety – Dick Bolt
- Cost Analysis – Bill Lawson

Study Particulars

- **Name:**
  - Fresnel Lens Gamma Ray Telescope
  - FLGammaRay_Discipline.ext used for discipline file names
- **Dates:**
  - January 7-10, 2002
- **Primary Client Representatives:**
  - Gerry Skinner, CESR, Lead Scientist
  - Neil Gehrels, GSFC/661, Scientist
  - John Krizmanic, GSFC/661, Scientist
- **Participants:**
  - See the file FLGammaRay_Attendance.xls